

# Ch.1 Embryology of male genital system ①

## A Male Sex DEtermination:

### a) Genetic (Chromosomal) Sex:-

- Determine at the moment of fertilization of the Ovum By sperm that contain (Y) chromosome →
- Resulting in:- Zygote → will develop into Male with XY chromosome

### b) Gonadal sex:-

- Resulting male sex chromosome will Direct the formation of the male gonads
- The ~~indifferent~~ indifferent gonads will develop into → male gonads OR Testes under influence of male chromosome

### c) Phenotypic sex:-

- The Resulting male gonads will Direct the formation of male phenotypic sex

- The internal and external genital organs will Develop into male genital organs under the influence of the Hormones Produced By the male gonads
- The chromosomal sex directs the gonadal sex → which in turn → Directs the phenotypic sex of the fetus.

## ★ Clinical points

### True Hermaphrodite

- Individual with Disturbance in the gonadal sex. So the individual has the gonads of Both male and females (testicular + ovarian)

II -

### Pseudohermaphrodite

- Discrepancy Between the genetic and gonadal sex on one side and phenotypic sex on the other side
- male genetic + gonadal sex with female phenotypic sex



## B Male Sex Chromosomes :-

(2)

### \* Historical Concepts :-

- The normal male pattern is (46XY)
- So called **H-Y antigen**  $\Rightarrow$  That is a product of Y chromosome  $\Rightarrow$  was the testis Determining Factor (TDF)  $\Rightarrow$  That induce The Development of the testis  
[this concept has been questioned for long time]
- another gene was proposed **Zinc Finger gene (ZFY)**

### \* Current Concept :-

- ① **SR Y gene** : found immediately adjacent to the pseudo-autosomal region of the short arm of the Y chromosome.
  - It's the major Regulator of testicular Differentiation
  - in addition to other genes Because there are some cases of gonadal Dysgenesis in spite of presence of normal SR Y gene

## ② DSS gene :- (Dosage-Sensitive Sex reversal)

- Dependent on the above mentioned **SR Y gene**
- Both of them are required For regulation of the male gonads.

## ③ MIS gene :-

This Mullerian inhibiting substance (MIS) gene  $\Rightarrow$  plays important role in the Differentiation of the testis

## C Male Sex Organs development

### \* Development of Gonads

- under the effect of these genes  $\Rightarrow$  gonad develop Begins at about the **5th week** of gestation as follows:

the **2 gonadal Ridges**  $\rightarrow$  appear as a Result of Proliferation of the Cells of the Coelomic epithelium and the underlying mesodermal Tissue.



- They are found along the Dorsal Body wall of the embryo

- Each one of the gonadal Ridges → found along the medial side of the mesonephric Ridge

↳ (that will form the Duct of this gonad + kidney)

- The gonadal Ridges ⇒ initially: Solid Cords of Cells (sex cords)  
⇒ Become Hollow → to form the Seminiferous Tubules ⇒ that anastomose together to form → Rete Testis

• These Ridges will give Rise to the 2 non-germinal elements of the testis

↓  
Sertoli cells

- inside the seminiferous Tubules
- From the cells of the coelomic epithelium
- at about the 7th week

↓  
Leydig cells

- outside the seminiferous Tubules
- From: Mesodermal Cells
- at about 8th week

• The 3rd element of the gonads :- ③

↳ Primitive germ cells (gonocytes)

- Develop outside the gonadal Ridges
- about 6th week → they start to develop inside the Yolk Sac → Then they migrate to the gonadal Ridges By: amoeboid movement to form → Spermatogonia later on.

\* Clinical points:

- Failure of migration of the primitive germ cells to the gonadal Ridges may manifest as: Sertoli cells only Syndrome

↓  
in which the testis is Devoid of Spermatogenesis

- appendix epididymis: Formed of some remnants of the mesonephric tubules → related to the head of the epididymis
- other name: [paradidymis - organ of Giraldez]
- Don't Confuse → appendix testis: Remnant of Mullerian Duct

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- 5<sup>th</sup> week → The formation of gonadal Ridges
- 6<sup>th</sup> week → The formation and migration of germ cells to gonadal Ridges From the yolk sac
- 7<sup>th</sup> week → Formation of Sertoli Cells Inside the gonadal Ridges from Coelomic epithelium
- 8<sup>th</sup> week → The formation of Leydig cells Inside the gonadal Ridges From Mesodermal tissue

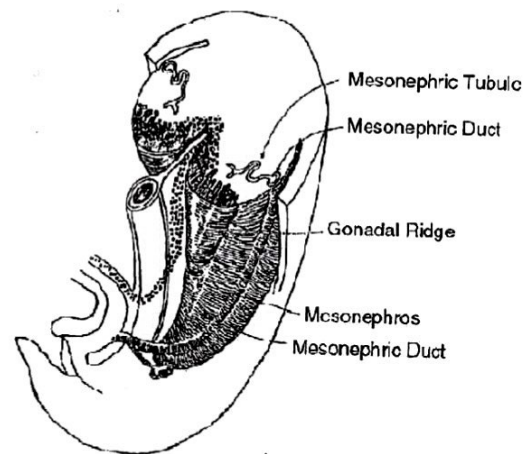


Fig. (1): Genesis of the testis (Hensle and Seaman, 1995).

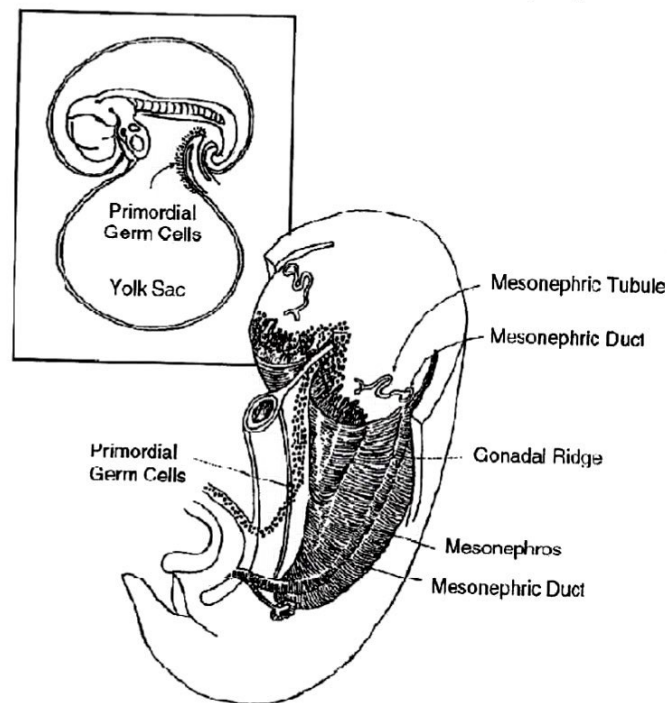


Fig. (2): Migration of germ cells (Hensle and Seaman, 1995).



## \* Development of internal Ducts

### (a) Pre-differentiation Stage :-

- In the indifferent state till the 8<sup>th</sup> week.
  - The Duct system is the Same in Both males + females
- It's Formed of :- mesonephric (Wolffian) Duct → on the lateral aspect of each gonadal Ridge and the paramesonephric (Müllerian) Duct on the lateral aspect of each mesonephric Duct
- The Wolffian Duct → ends By opening into the urogenital sinus
- This termination Divides the Urogenital sinus into
  - ↓ upper part
  - ↓ Lower part
- give Rise to the Bladder
- give Rise to the Urethra, prostate External genitalia

### (b) Post-differentiation Stage :- ⑤

#### • The paramesonephric (Müllerian) Duct :-

→ The First event in the development of male ductal system is :-

The onset of Müllerian Duct Regression.

• This Regression is under control of :-

→ Müllerian inhibitory Substance (MIS)  
→ secreted By :- foetal Sertoli cells

• Under the effect of this Hormone ⇒ The Müllerian Duct undergo Regression  
Except for :- 2 small rudimentary portions :-

- The appendix testis.
- The prostatic utricle.

• This Regression is dependent upon a process of apoptosis

(Degeneration of the cells By means of cell Break Down into membrane-bound fragments (apoptotic Bodies) followed By Shedding or phagocytosis)



## ★ Clinical points

① Primary infertility: abnormal prostatic Utricle → manifest By: Infertility

- in those pt → there may be (Congenital cyst of the Remnants of the Müllerian Duct)

↓  
Obstruction of the ejaculatory Ducts + infertility

② prostatic Carcinoma:

- Some cases of endometrial Carcinoma at the Region of the prostatic Utricle which → Denotes that the prostatic Utricle may contain some Uterine Tissue

• the Mesonephric (Wolffian) Duct:

→ The Second event: Development of male Duct system is Wolffian Duct Growth

→ This Growth → under control of Testosterone

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- act Directly By → Local Diffusion  
(not through the Blood stream on the duct of same side)

→ it Bind to: Androgen Receptors → Inside the Cytoplasm of the cell

↳ Transmitted to → the nucleus where the (Hormone - Receptor Complex) → Interact with the nuclear chromatin

↓  
to activate molecular Synthesis → prevent Duct degeneration

- Some rete Testis tubules → Become Connected to some mesonephric tubules of the Wolffian Duct → to Form the Rest of the epididymis, Vas deferens, Seminal Vesicles, and the ejaculatory Duct at About 12<sup>th</sup> week.

## ★ Clinical points

• The Seminal vesicles → arise as an outgrowth from Vas deferens

So → Congenital bilateral absent Vas → also absent Seminal vesicles



# \* Development of External Genitalia

- The Wolffian Duct ends into → The Urogenital sinus.
- its orifice surrounded By:
  - ↳ genital tubercle
  - ↳ genital swellings
  - ↳ Urogenital folds
- Testosterone → is the Hormone Responsible for the Development of the Wolffian Ducts
- The Development of External genitalia During the period from 9<sup>th</sup> till 12<sup>th</sup> week Depending on: Dihydrotestosterone
  - That is Derived from: Testosterone By the enzyme: 5- $\alpha$  Reductase
- Under the effect of Dihydrotestosterone
  - ↳ the external genitalia are formed as the follows: [7]

- 1- the genital tubercle → elongate to form the penis (7)
  - 2- The genital swellings → fuse in the middle line to form the Scrotum.
  - 3- The Urogenital Folds → fuse in the middle line to form → the penile Urethra. along the ventral surface of the penis and the Urethral meatus is moved progressively toward the glans.
- There are 3 Related Structures that are Formed as follows:
 

Prostate

    - Develop → Below Bladder
    - From → the endoderm of The Urogenital Sinus (endodermal buds) OR From → Prostatic Urethra.

periothral glands

    - The Cowper's glands arise as epithelial buds from the proximal part of the penile urethra.
    - The Littre's glands arise along Urethra from The Bladder neck to glans penis

Prepuce

    - Fusion of the Urethral Folds at the Ventral Surface of the Glans ↓ normal development of Ventral surface of prepuce



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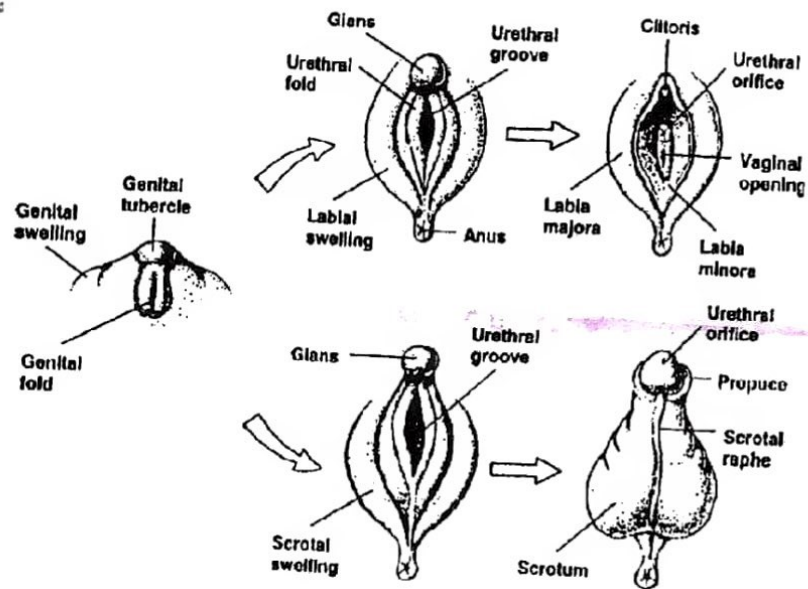


Fig. (4): Development of the external genitalia (Mandell, 1998).

## \* Congenital Anomalies of the External genitalia

### A Anomalies of the Meatus:

#### a. Abnormal Size:

- Small size of the Urethral meatus (pinhole meatus) ⇒ Congenital
- It may be acquired that associated e- neonatal Circumcision

• This can be explained By:

↳ meatus inflammation → D.t Cutting of the normal adhesions Between the prepuce and the glans

↳ or By meatal devascularization → D.t Cutting of the Frenular artery

## b. Abnormal Positions :-

### ① Hypospadias:-

- Congenital anomaly in which the urethral meatus formed on the undersurface of the penis
- Owing to the fact that :- The proper formation of prepuce is Related to the proper fusion of the Urogenital folds to Form the Urethra.
- Cases of Hypospadia associated :- Incomplete ventral surface of the prepuce
- The Severe form of Hypospadias associated :- Bifid scrotum → D.t Failure of Fusion of the i- genital swellings, penile Curvature (chordee)  
• Failure of semen deposition in the vagina ⇒ may lead to Infertility



## ② Epispadias:

- Congenital anomaly in which the Urethral meatus found on the Dorsal Surface of the penis
- It may be associated with Infertility

## [B] Anomalies of the Penis

### a. Abnormal Size:- micro-penis

- the penile size is  $\downarrow\downarrow$  By at least 2.5 SD Below the mean size.

### b. Abnormal shape:-

#### ① Concealed penis:- (Buried) (hidden)

- normally developed penis that is Covered partially By: Suprapubic Fat on Dorsal Surface.
- It may be Congenital Due to Inelastic Dartos Fascia that normally allows Free mobility of The penis on the penile shaft

which Restricts extension of the penis

#### - Acquired after Circumcision

in old infants and children Due to excessive suprapubic fat.

## ② Webbed penis:-

- is normally Developed penis that is Covered partially By the Scrotal skin on its ventral surface.

- It may be Congenital:-

Due to abnormal attachment Between the penis and the Scrotum.

- Acquired after Circumcision.

- Condition treated By: incising the web transversally separating the penis from Scrotum and closing the Skin vertically

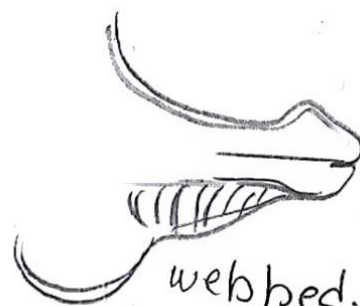


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normal



concealed



webbed.



## ⑩ Indication - Contraindication of Circumcision :-

- D.F. :- Surgical Removal of the prepuce that covers the glans penis.
  - Only in male
  - No Female Circumcision
  - in some Countries of Egypt and Africans Called "Female genital mutilation"
    - ↳ in which clitoris and other parts of female genitals are Removed in **Crime** that is **Prohibited** By Religion ethics medicine
- male Circumcision Indicated For :-
  - Religious - Social reasons
  - Have a Role in prevent penile Cancer
    - urinary Tract infection ● STDs
    - Phimosis ● balanoposthitis
    - Cervical Carcinoma.
- Contraindicated :-
  - in ptnr ● Hypospadias ● small penis
  - Webbed penis ● neonatal sepsis

## Testicular descent :-

- Testis :- Retroperitoneal organ High in the Posterior abdominal wall.
  - During the 3rd trimester → it slips Down the posterior wall accompanied By its neurovascular supply → to Reach the level of the internal inguinal Ring By the 7th month
  - Finally it acquires its extra-abdominal position in the Scrotum
- The Factors Responsible for testicular Descent into 3 main Factors :-
  - ① Hormonal F
    - ↳ non-androgenic control
    - ↳ Androgenic control
  - ② Mechanical F :-
    - ↳ Traction Theory
    - ↳ pressure Theory
    - ↳ Neurologic Theory



## a. Hormonal Factors:

### 1- Non-Androgenic Control:

- The intraabdominal descent of Testis Till the level of the internal Ring is Depending on:

(MIS) Mullerian inhibitory substance secreted by the foetal Sertoli Cells.

### 2- Androgenic Control:

- The extra abdominal descent of the testis Below the level of the internal Ring is Depending on:

Androgen secreted By foetal Leydig cells

-(GnRH)  $\rightarrow$  produced By: the Hypothalamus  $\rightarrow$  Stimulating Release of gonadotrophins: FSH, LH

They stimulate foetal Leydig cells to produce testosterone  $\rightarrow$

that is finally Converted By: The enzyme 5- $\alpha$  Reductase into  $\rightarrow$  Dihydrotestosterone (11)

$\downarrow$   
The Active Androgen  
Responsible for the  $\rightarrow$  testicular descent.

## b. Mechanical Factors:

### • Traction theory:

- Testicular Descent ~~at~~ into Scrotum dependent on: Downward traction on the testis By the: Gubernaculum testis

$\rightarrow$  formed as follows:

The embryonic testis is at first Connected to Diaphragm By the Cranial gonadal ligament  $\rightarrow$  that Rapidly Disappears

- in Contrast to: Caudal gonadal ligament  $\rightarrow$  That continue to grow and extend from the Lower pole of the testis to the inguinal Canal to Form the Gubernaculum testis  $\rightarrow$



⑫ That enlarge and swells into Scrotum exerting traction on the testis into Scrotum.

→ During its Descent → The testis is accompanied by a peritoneal pouch termed Processus Vaginalis

That persist around the testis as the Tunica vaginalis after the obliteration of its connection with abdominal cavity

### ● Pressure Theory:-

● Testicular Descent into Scrotum is dependent on:- Downward pressure on the testis by the growing abd. viscera:

### ● Neurological Theory:-

● Testicular Descent into Scrotum is depending on: genitofemoral nerve as follows:

→ under the effect of Androgens → the nuclei of Genitofemoral nerve → Stimulate the Release of some factors as

to modulate the structure and the function of the gubernaculum.

↳ Calcitonin gene Related peptide CGRP

### ④ Clinical points

1. The incidence of undescended testis → Varies according to the Developmental stage as Follow:-

- ↳ 30% among Preterm infants
- ↳ 3% among fullterm infants
- ↳ 1% among 1yr infants

2. The Coincidence of undescended testis → with Hypospadias → Suspicious of Intersex.

3. Due to importance of the endocrinal Factors in testicular descent → undescended testis may associated:-

- endocrinal Disorders of Hypothalamus
- Pituitary glands :-

Pituitary Aplasia

- ↳ Kallman Syndrome
- ↳ anencephaly
- ↳ Androgen defect syndrome



# Anatomy of Male Genital Organs

①

## A - Covering of the penis :- 3 covers

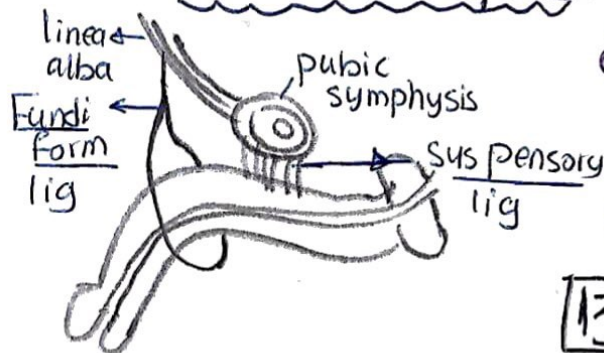
### 1- Buck's Fascia :-

- Deep fascia of the penis - it's a Strong layer that extend from:- The Base of the glans penis till the attachment of the penile Root with Pubic Bone
- it's Firmly attached to the underlying Tunica albuginea of the penile Corpora.

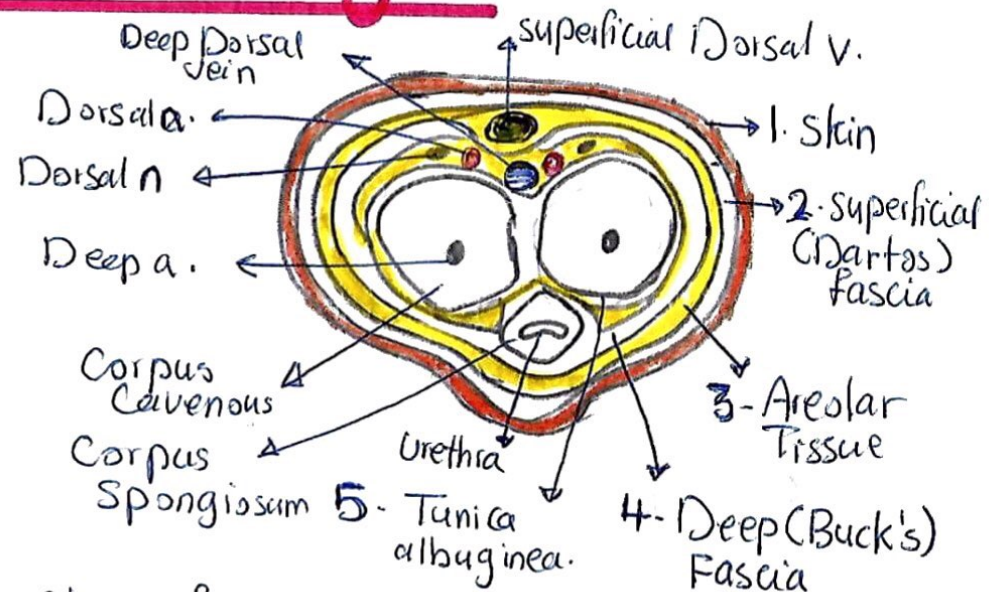
### 2- Colle's (Dartos) Fascia :-

- The Superficial fascia of penis - Thin layer that extends to be connected to the fascia of the scrotum. - it's Loosely attached to the underlying Buck's fascia

### ★ Ligaments of the penis:



- ① Fundiform lig:- arise from the fascia of the ant. abd. wall. → Then it pass → superficially to be inserted into superficial fascia of the penis on either sides of penis then fuse again inferior to the penis
- ② Suspensory lig:- arise from the pubic symphysis. Then pass Deeply to inserted into Deep fascia





### 3- Penile Skin:

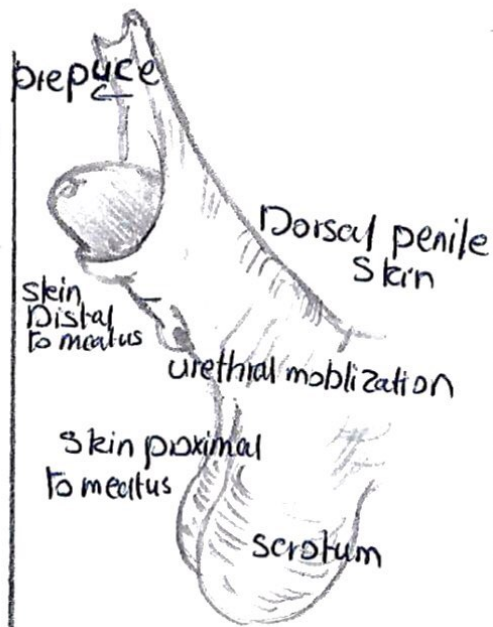
- Thin skin - loosely attached to the underlying 2 layers of fascia.
- Contain:-
  - ↳ sebaceous, sweat glands

- Free from:- S.C fat & Hair

- At the Distal of the shaft:-  
The skin folds on its self as the Prepuce

Then continue as thin adherent layer that cover the glans

- a small 2ry fold of skin that is just proximal to the urethral meatus "Frenulum"



### Clinical points

- ① The loose attachment Between the skin and underlying 2 fascial layers:-

Help the free movements of the skin over the penile shaft that is of great significance in the penile erection and flaccidity with changes in its Size

### ② The ~~Seg~~ Smegma:-

- the sebaceous secretion of the glans of the prepuce
- help the movement of the prepuce over the glans.
- lack of personal hygiene  $\Rightarrow$  accumulation of this smegma under the prepuce that may be associated with:- Chronic inflammation, Squamous metaplasia
- Early Circumcision  $\rightarrow$  help to avoid this complication.

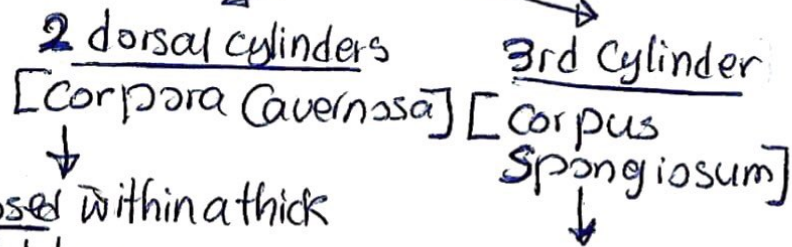
### ③ The Deep Fascia in the penis:- encloses the penis firmly like a capsule from Behind the glans $\Rightarrow$ Till the membranous Urethra

- [14] - any injury of penile urethra  $\rightarrow$  extravasation of urine & Blood inside penis only
- injury membranous urethra  $\rightarrow$  extravasation of Blood outside the deep fascia to penis, scrotum



## (B) - Compartments of the penis :-

- 3 compartments in 3 parallel longitudinal cylinders.



- enclosed within a thick fascial layer

- The thin fascia of C. Spongiosum + the thin Tunica albuginea + low pressure inside it

↓  
help to prevent pressure on the Urethra that remain patent to be ready for passage of the ejaculate.

- The Rigidity depends on :- Corpora Cavernosa.

- envelope the Urethra along its course along the lower surface of the penis.

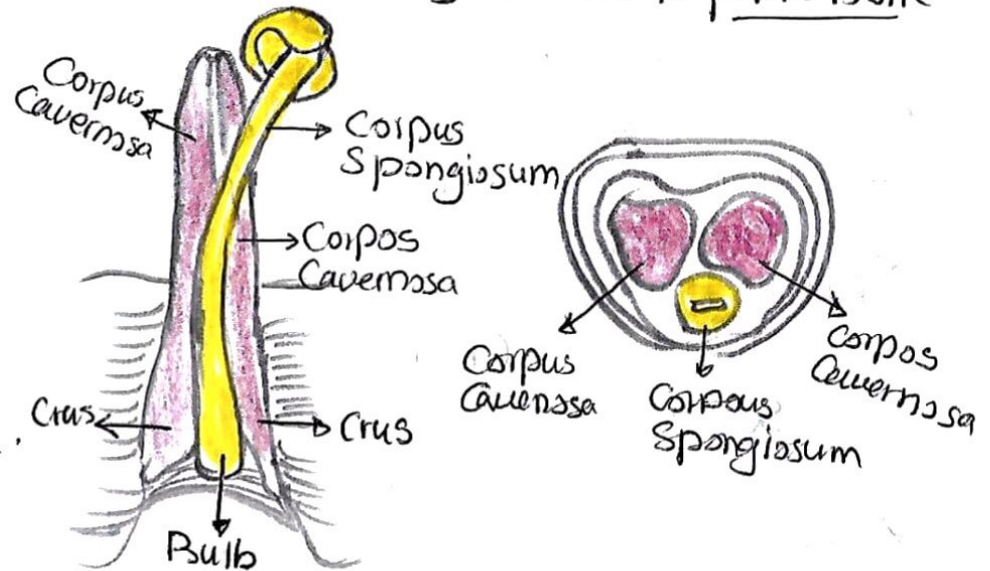
- enclosed within thin fascial layer
- expand at its distal end to form glans penis that attached above to distal round ends of the 2 Corpora Cavernosa.

## - The Root of the penis :- formed By :- (3)

→ The proximal ends of the 3 Corpora. as :-

- the Corpus Spongiosum expands at its proximal end to form bulb through which the bulbar Urethra passes.

- The 2 Corpora Cavernosa Diverge at their proximal ends to form the corresponding Right, left Crura of penis that become firmly attached to pubic Bone





★ Clinical

## Components of penis :-

- each Corpus composed of 3 elements :-

Tunica Albuginea :-

- Strong - Tough fibrous white Coat that encloses each Corpus of the penis
- multilayered structure Formed of → alternating Bands of Circular and longitudinal layers of Collagen.

- The Tunica albuginea of the 2 Corpora Cavernosa Fuse in the midline to form the Septum but Separate proximally to form Crura

- The septum allow → Free Blood flow Between the 2 Corpora Cavernosa.  
So → the 2 corpora form one vascular space

Areolar layer of Smith

- Thin layer of areolar connective tissue that is just underneath the Tunica albuginea separating it from the erectile (Cavernous) tissue

Erectile (Cavernous) tissue

- Spong-like tissue → Formed of multiple Cavernous spaces or Sinusoids filled w Blood.

- Sinusoids → lined By Endothelium

- The wall of these Sinusoids called "trabeculae"

- ↳ Formed of :- Smooth muscles

- ↳ Framework of :- Collagen + elastic fibers

- ↳ Contain :- Branches from the Deep arteries and the veins of the penis



## ★ Clinical points

① Penile erection → depends on :- Relaxation of the smooth muscle of the arteries and Cavernous spaces with → filling of these spaces w Blood and ↑↑ penile size.

↳ leads to :- Compression of the penile veins in between the sinusoids and against the tough tunica albuginea

↳ elevation of intracavernosal pressure  
↳ ↑↑ Penile Rigidity

## ② Peyronie's Disease :-

- Inflammation + fibrosis in the Tunica albuginea and the underlying areolar space of Smith

↓  
Erectile Dysfunction

## D Arteries of penis :- ⑤

● Main Blood supply of penis come from :- internal pudendal artery on each side that it a branch of :- internal iliac artery at the level of greater sciatic foramen

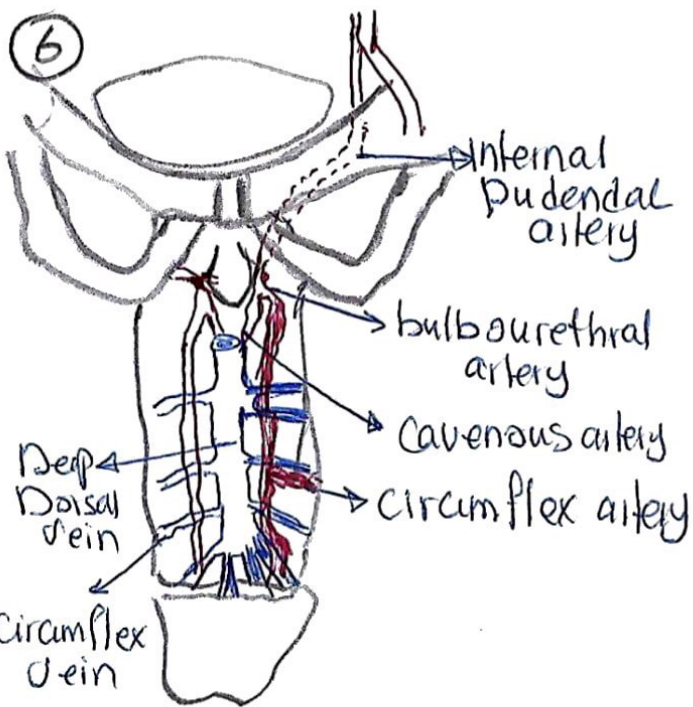
→ The internal pudendal artery enter perineum through :- Lesser sciatic foramen.

● After giving perineal Branch to the perineal muscles → it passes through Ischiorectal fossa to Become the :- Penile artery

● Penile artery → passes along the inferior pubic ramus to give on each side its 3 terminal Branches

- 1- Dorsal artery
- 2- Cavernous (Deep penile) artery
- 3- Bulbourethral (Spongiosal) artery





## 1 Dorsal Artery

- Travel Between Tunica albuginea and Buck's fascia
- along the Dorsal surface of the penis where its Lateral to the single deep dorsal vein with the Dorsal nerves lying Lateral to the artery
- The Final arrangement of this Dorsal neurovascular Bundle is (V.A.N)
- The Vein is the most medial & the Artery in the middle & the Nerve most lateral
- Along its course → it gives Circumflex branches that supply → Urethra
- when it reaches the glans → it gives Helical Branches that ~~supply~~ Finally ends By anastomosis with the bulbourethral artery

## 2 Cavernous (Deep penile) Artery

- each Cavernous artery → Enter into Corpus Cavernosum.
- along the Course through Corpora Cavernosa → the artery gives off 2

Types of Branches :-

↳ Trabecular Branches to the trabeculae or the wall of Blood Sinusoids.

↳ Helical Branches to the Cavities of Blood Sinusoids.

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These Helical Branches → tortuous Cork-screw Course and enter into Blood Sinusoid Directly without traversing Capillary bed.



### 3. Bulbourethral

(Spongiosal) Artery:-

- this artery → passes Longitudinally through the substance of Corpus Spongiosum
- Along its course → it gives 2 Branches:-
  - First → bulbar branch that supplies the bulb of Urethra
  - Second → Urethral Branch that supplies the Urethra and Corpus Spongiosum. and finally supply the glans penis
- Blood Supply to penile skin:-  
dependant upon Right - left external pudendal arteries  
That arise from:- Femoral artery and form → rich subdermal vascular plexus

### ★ Clinical points

#### ⑦ Arterial supply and penile erection:-

the tortuous course and the special arrangement of the helical arteries → essential factors in ↑↑ Blood flow to cavernous space during erection.

— This is helped by:- rich anastomosis between all the arteries of the penis specially:- the Shunt arteries → Connect the Deep penile arteries in Corpora Cavernosa with the arteries in Corpus Spongiosum

### E Veins of the penis:

→ Veinous Drainage of penis arranged in 3 systems

#### ① The Superficial system:-

- this system → Drains the skin and S.C tissues
- it consist of:- superficial Dorsal veins  
(single vein that passes on the Dorsal surface of the penis superficial to the Buck's fascia and Drains into:- Saphenous vein)



## 2 The Intermediate System:

- Drains the glans, the C. Spongiosum and the Distal part of C. Cavernosa
- Consist of: (Deep Dorsal vein)

↳ single vein that passes on the Dorsal surface of the penis Deep to the Buck's fascia. and Drain into → the Prostatic venous plexus of Sanotorini

after passing via → the suspensory ligament under the pubic Bone

- Along its course: The Deep Dorsal vein Receives the following veins

↳ 5 to 8 small veins from the glans  
That form → the retrocoronal plexus which Drains into the Deep Dorsal vein

↳ 8 to 12 emissary veins  
↳ start as subtunical veins between the sinusoids and Tunica albuginea pierce → the T. albuginea to reach lateral surface of Corpora.

## 3 The Deep System:

- Drain → the proximal parts of C. Spongiosum and Most of C. Cavernosa.
- Consist of → Crural - Cavernosal veins

1- The Crural vein: small veins that pass in the midline in the space Between the Crura and Drain finally into the prostatic venous plexus

2- The Cavernosal vein:

- Large veins that pass as one or two veins from each Crus along its lateral surface.
- Drain finally into the internal pudendal vein
- The vein → Run together with the internal iliac artery to Drain into I.I. vein

→ well then Form the Circumflex veins

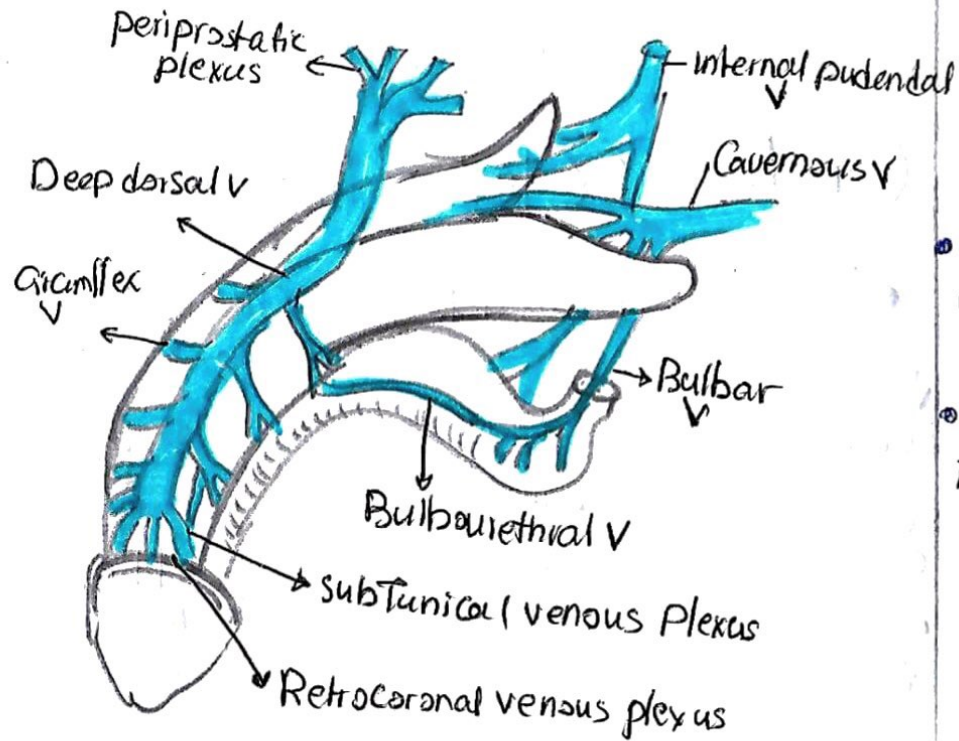
↳ pass along Dorsal and lateral aspect of C. Cavernosa & Ventral aspect of C. Spongiosum

- The Circumflex veins → Drain the Corpus Spongiosum + the Distal parts of C. Cavernosa.



## ★ Clinical Points

- The Compression of the Subtunical veins Between the enlarged sinusoids and the Tough tunica albuginea and the Emissary Veins By the Stretch T. albuginea are important Veno-occlusive mechanisms for the process of erection



## F Nerves of the penis :- ⑨

### ① Somatic Supply

- The Center of these Somatic nerves is in the Segments (S2, S3, S4) of Spinal Cord
- it gives : Motor + Sensory fibers along the pudendal nerves as follows:

#### Motor Branch

- motor to :- Ischiocavernosus and bulbocavernosus muscles
- whas contraction help to ↑↑ the Rigidity of Erection

#### Sensory Branch

- Sensory to the following area
- ① penis :- through the Dorsal nerve of the penis  
↓  
Pass laterally to the artery and vein in the Dorsal neurovascular Bundle
- ② Perineum :-  
Through perineal nerve
- ③ Rectum :-  
Through Rectal nerve.



## ② Parasympathetic supply

- The Center for these parasympathetic nerves is in the Segment (S<sub>2</sub>, S<sub>3</sub>, S<sub>4</sub>) of the spinal cord.

- it gives its Branches as follows:-

Pelvic nerve or nervi erigents → pelvic plexus → prostatic plexus.

- This prostatic plexus ⇒ Supplies the penis with greater Cavernous nerve to

The C. Cavernosa and lesser Cavernosal nerve to C. Spongiosum

## ③ Sympathetic supply

- The Center of this Sympathetic nerves is The Segment (T<sub>11</sub>-T<sub>12</sub>-L<sub>1</sub>-L<sub>2</sub>)

- it gives its Branches as follows:-

Superior hypogastric plexus → pelvic plexus → prostatic plexus.

- Then the Sympathetic fibers pass with

The parasympathetic fibers in the Cavernosal nerves of The penis

## ④ Clinical points

- The Cavernous nerve is Related to The prostate and Urethra. at the 3 and 9 O'clock positions  
So its Liable to injury During Prostatic surgery  
Resulting in :- Erectile failure

## ⑤ Muscles of the penis

- 3 muscles related to the penis:

